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[0001] USER EQUIPMENT (UE) ASSISTED SYSTEM DATABASE UPDATE

[0002] CROSS REFERENCE TO RELATED APPLICATIONS

[0003] This application is a continuation of U.S. Patent Application Serial No. 10/328,623, filed December 23, 2002, which claims the benefit of United States provisional application no. 60/392,211 filed on June 28, 2002, which is incorporated by reference as if fully set forth.

[0004] FIELD OF THE INVENTION

[0005] The present invention relates to wireless communication systems. In particular, the invention relates to database processing of information for user equipment (UE) handover.

[0006] BACKGROUND

[0007] User equipment (UE) in wireless communication systems are beginning to provide functionality for internet/public service telephone network (PSTN) access via multiple wireless systems (such as (WLANs), Bluetooth® a registered trademark for a wireless network, universal mobile telecommunications system (UMTS), general packet radio service (GPRS), etc.). Hence, there is a growing need for these systems to work with each other in order for a UE to handover from one technology to another.

[0008] To assist in a handover, a wireless communication system base station can relay to a UE the information pertaining to outside systems. Thus, a base station needs to retain and constantly update information about the other systems. Retrieval of the information about another system is possible through secure inter-system connections (such as via an IP-cloud, for example) under roaming agreements. However, it is a deployment challenge to maintain and update such information about other systems. Hence there is a need for an alternate source to assist the base station

in supplying the outside system information in order to eliminate the need for explicit inter-system connections and communications for this purpose.

[0009] SUMMARY

[0010] The present invention employs a technique for obtaining and updating data relating to neighboring wireless systems.

[0011] BRIEF DESCRIPTION OF THE FIGURES

[0012] Figure 1 is a simplified diagram showing a plurality of wireless systems and user equipments within the wireless systems, which may employ the technique and principles of the present invention to great advantage.

[0013] Fig. 2 is a flow diagram useful in explaining the principles of the present invention and a method to implement such a system.

[0014] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] FIG. 1 shows a multimode UE 101 operating within a wireless system 102 having an associated base station (BS) 102b, while also being able to detect multiple surrounding wireless systems 103-105. Upon detection of information from wireless systems 103-105, UE 101 sends the current information to BS 102b of system or systems 103-105. BS 102b can then update its database based on this new information from UE 101. Likewise, subsequent handovers of UE 101 to other base stations can provide base station database updates. For example, after handover to wireless system 103, UE 101 sends information pertaining to the most recently resident system (i.e., system 102), to base station(BS) 103b, which then updates its database accordingly.

[0016] FIG. 2 shows a process flow diagram for the exchange of information between BS 102b and UE 101. Although this process is shown with a single UE for simplicity in explanation, multiple UEs may interact with BS 102b at the same time. System information that is sent from a UE to the BS and vice versa may include, but is not limited to: geo-location of a UE, new system, congestion at the network and failure

to detect a network.

[0017] At UE-S1, UE 101 obtains information relating to network 104, for example. At step UE-S2, UE 101 transmits its identity to BS 102b. At step BS-S1, BS 102b receives the identify of UE 101. At BS-S2 BS 102 first authenticates the identity of UE 101. This ensures that BS 102b will not accept information about other systems from malicious UEs. Next, at step UE-S2, responsive to the authentication, the information is protectively encoded for integrity by UE 101 and, at step UE-S3, the protected information is transmitted by UE 101 to BS 102b. A preferred method of protective encoding is via message authentication codes. Encryption may also be used to protect the information from being eavesdropped. At step BS-S3, BS 102b verifies the integrity of the information. At step BS-S4, BS 102b accepts the information and updates its databases. Now that BS 102b has updated its database, BS 102b, at step BS-S5, may communicate with adjacent systems 103-105 at regular intervals or triggered instants of time to validate the information updates received from UE 101. Corrections to the database, if needed are made at step BS-S6.

[0018] System efficiency can be gained by BS 102b taking a proactive role in letting UE 101 know of its surrounding systems, at step BS-S7. Hence, UE 101 need not send any information if its resident system is on the list provided by BS 102b. This reduces radio traffic due to multiple UEs sending similar information.

[0019] This database stored in each BS is used for cell re-planning and system layover during deployment of additional networks. For example, consider a UMTS system overlaid over disjointed WLANs. The information gathered at the UMTS base station is used for planning WLAN network in that area. System 102 gets geo-locations of different UEs as they communicate about other systems (say System 103). The operator can use the geo-location of each UE that reported about system 103 to approximate the coverage of system 103. This approximate coverage area can be used to plug coverage holes or future deployment planning of system 103.

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